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(54) Sound damping shield for a vehicle wheel

(57) In the outer edge region of disc 6, in addition to a sealing lip 22 arranged on the side of the disc remote from the vehicle wheel 4, a further sealing lip 38 is provided on the side of the disc which faces the vehicle wheel. Both lips 22, 38 open under the influence of centrifugal force to increase the length of the resonator chamber 18 located between the disc side walls 28, 30 and provide more effective sound damping than hitherto.

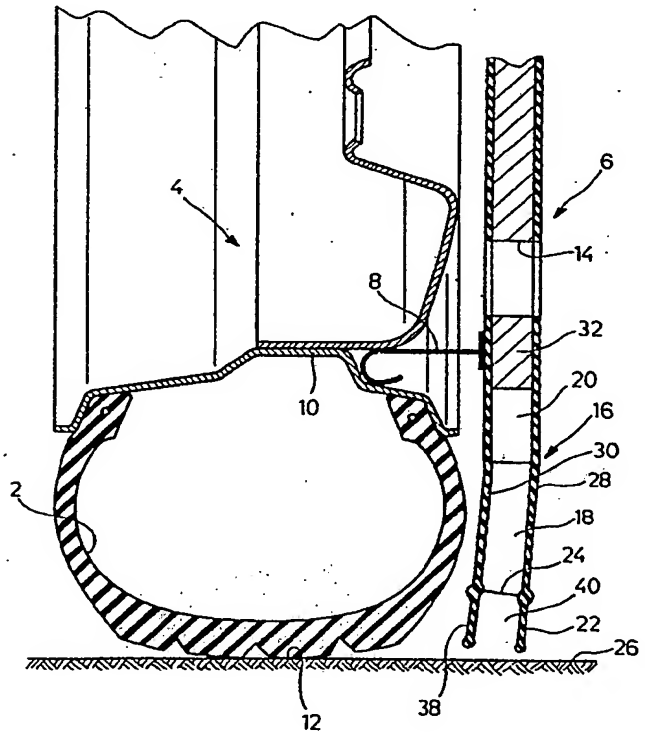

FIG. 1

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SPECIFICATION

Sound damping shield for a vehicle wheel

This invention relates to a sound damping shield for a vehicle wheel comprising a sound damping disc adapted to co-rotate with the vehicle wheel adjacent to the wheel tread, the disc having a cavity arrangement, which opens on one side towards the disc periphery and acts as a resonator, and a sealing lip which is disposed on the outer edge region of the disc at the side of the disc remote from the vehicle wheel and operates to free the resonator opening under the influence of centrifugal force.

A sound damping shield of this kind is described in German Patent Application P 33 28 519.5.

The object of the invention is to provide a sound damping shield of the kind mentioned in the opening paragraph whereby enhanced sound damping is achieved by a simple structural modification.

This object is achieved in that a further sealing lip is disposed on the outer edge region of the disc at that side of the disc which faces the vehicle wheel.

In accordance with the invention, as a result of this double-sided sealing lip arrangement the sound absorption behaviour of the sound damping disc, as compared with the previously known sound damping shield is considerably improved. This is because in the open condition of the sealing lips, which is the condition in the event of fairly high rotational speed of the wheel, the air column defined by the sound damping shield, which is the decisive factor for sound damping at the individual wide-band resonators, is effectively lengthened by the additional resonator space created between the sealing lip. Nevertheless, the protective action of the sealing lip arrangement fully persists when the vehicle wheel is stationary or rotating slowly.

In the event of low rotational speed, the resonator opening is preferably jointly closed by both sealing lips so that the cavity arrangement is more effectively protected against soiling whilst the vehicle is at a standstill or travelling at a slow speed. Also, joint closure or freeing of the resonator opening by both lips means that the centrifugal-force-dependent movements of each sealing lip are kept relatively small, i.e. are approximately halved compared to an arrangement with only a single lip.

Advantageously, additional resonators which open towards the vehicle wheel are arranged in the regions of the disc which bound the cavity arrangement. These additional resonators are preferably 2/4 or Helmholtz resonators and enhanced damping of particularly disturbing sound frequencies can be achieved depending on the spatial shape of these additional resonators so that the overall shielding action of the sound damping shield can be further improved.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic section illustrating a preferred embodiment of a sound damping shield of the invention fitted to a car wheel;

Figure 2 is a similar schematic view, partly in broken lines and to smaller scale, sound damping shield shown in Fig 1, but in a different sectional plane (II of Fig 3) and with the sealing lip arrangement closed, and;

Figure 3 is a partially broken away inside view of the top of the same sound damping shield in the outer edge region of the disc.

The sound damping shield of the invention, as illustrated by way of example, in the drawings, serves to reduce the noise radiated by a car tyre 2 and is for this purpose designed as a sound damping disc 6 which can be fixed to a car wheel 4, as indicated, by means of hook-like members 8.

The sound damping disc 6, in accordance with this invention, differs from a similar previously known disc (described in German Patent Application No P33 28 519) in that in the outer edge region 16 of the disc 6 in addition to a sealing lip 22 on the side of the disc 6 remote from the tyre 2, a further sealing lip 38 is arranged on the side of the disc 6 facing the tyre 2. The sealing lips 22 and 38 are arranged at the edges of respective side walls 28, 30 of the disc 6 and each lip 22, 38 consists of several elastic sealing lip segments which are contiguous in the circumferential direction of the disc 6. These lips 22, 38 are resiliently biassed into their closure position, as shown in Fig 2, so as to jointly close the resonator opening 24 between the side walls 28, 30 when the vehicle wheel 4 is stationary or rotating slowly. At a higher rotational speed of the wheel 4, the sealing lips 22, 38 open automatically under the influence of centrifugal force and thereby free the resonator opening 24.

Moreover, in their fully open position, as shown in Fig 1, the lips 22, 38 define between them an additional resonator chamber 40 whereby the air column which is decisive for the damping effect of the individual wide-band resonators 18 located between the side walls 28, 38 is effectively lengthened beyond the resonator opening 24.

Since the path of movement of each sealing lip 22, 38 between its open position and its closed position is relatively small, i.e. it is approximately only half as great as the width of the sound damping disc 6, it is possible to form the sealing lips 22, 38 integrally with the side walls 28, 30, which are made of rubber or foam material. Alternatively, the outer edge region 16 of the disc 6, which itself acts in a spring-elastic manner, can be constructed as a double lip arrangement.

As shown in Figs 2 and 3, in the regions between the walls 28, 30 of the sound damping disc 6 which define the wide-band resonators 18, additional resonators 42 in the form of 2/4 or Helmholtz resonators are provided. These resonators 42 have resonator openings 44 in the disc wall 30 which faces the car tyre 2 and increased damping of one or more particularly disturbing frequencies can be achieved by appropriate co-ordination of the length of these individual additional resonators 42.

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CLAIMS

1. A sound damping shield for a vehicle wheel comprising a sound damping disc adapted to co-rotate with the vehicle wheel adjacent to the wheel tread, the disc having a cavity arrangement which opens on one side towards the disc periphery and acts as a resonator, and a sealing lip which is disposed on the outer edge region of the disc at the side of the disc remote from the vehicle wheel and operates to free the resonator opening under the influence of centrifugal force, characterized in that a further sealing lip is disposed on the outer edge region of the disc at that side of the disc which faces the vehicle wheel.

2. A sound damping shield as claimed in claim 1, characterised in that the resonator opening is jointly closed or freed by both sealing lips under the influence of centrifugal force.

3. A sound damping shield as claimed in claim 1 or 2, characterised in that additional resonators opening towards the vehicle wheel are arranged in the regions of the disc which bound the cavity arrangement.

4. A sound damping shield as claimed in claim 3, characterised in that the additional resonators are in the form of Helmholtz resonators.

5. A sound damping shield for a vehicle wheel substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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